



NOTES TRYPANOSOMA

GENERALLY, WHAT ARE THEY?

PATHOLOGY & CAUSES

- Genus of flagellated parasitic protozoa

Morphology

- Elongated body
- **Flagellum**: forms undulated membrane along body
- **Kinetoplast**: functions as mitochondrion

Transmission

- Through vectors
- **Incubation period**: 1–2 weeks

SIGNS & SYMPTOMS

- See individual pathogens

DIAGNOSIS

- Direct microscopy
- Serologic testings
- Laboratory findings
- Additional diagnostic tests may be necessary (severity, infection site-dependent)

TREATMENT

- See individual pathogens

TRYPANOSOMA BRUCEI

osms.it/trypanosoma-brucei

PATHOLOGY & CAUSES

- Protozoan, extracellular parasite → African trypanosomiasis
- AKA “**sleeping sickness**”
 - Neurologic alterations during meningoencephalitis stage (e.g. somnolence)

Virulence factors

- Antigenic variation
 - Changes variant surface glycoprotein (VSG) → immune response evasion
- ↑ interferon gamma → ↑ host *T. brucei*

susceptibility (mechanism unknown)

Morphologic forms (life-cycle)

- Epimastigote → procyclic trypomastigote (in tsetse fly midgut) → metacyclic trypomastigote (infectious form)

Subspecies

- *Trypanosoma brucei rhodesiense* (acute, more severe disease course)
- *Trypanosoma brucei gambiense* (progressive, milder disease course)

Reservoirs

- Domestic animals, lions, hyenas, antelopes

VISIT...

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Vector

- Male/female Glossina flies, AKA **tsetse flies**
 - Ideal conditions:** warm, humid climate (e.g. near river/lake); altitude < 1800m/5905ft

Transmission

- Saliva inoculation via **fly bite**; vertical/parenteral transmission very rare
- Endemic regions:** sub-Saharan Africa; Democratic Republic of Congo (most cases)

Pathogenesis

- Glossina bite → subcutaneous metacyclic trypomastigote inoculation → lymph vessels → bloodstream → ↑ tumor necrosis factor (TNF) alpha, interleukin 6 (IL-6), nitric oxide → ↑ capillary permeability → vasculitis → organ invasion, e.g. central nervous system (CNS)

Disease stages

- Hemolympathic (early) stage
- Meningoencephalitis (late) stage
- Symptom severity related to number of organisms in affected tissue (e.g. blood, CNS)

RISK FACTORS

- Recent endemic area travel
- Dense vegetation near human settlement

COMPLICATIONS

- Meningitis
- Myocarditis, heart failure
- Aspiration → bacterial pneumonia; associated with altered state of consciousness (meningoencephalitis stage)

SIGNS & SYMPTOMS**Hemolympathic stage**

- Systemic symptoms
 - Intermittent fever**, headache, malaise, weakness, pruritus, rash
- Trypanosomal chancre
 - Rubbery, painful, erythematous, well-circumscribed lesion at fly bite site approx. one week post-inoculation

- Lymphadenopathy
 - Winterbottom's sign:** **enlarged** mobile, soft posterior cervical triangle **lymph nodes**
- Hepatosplenomegaly
- Dyspnea
- Chest pain
- Altered thyroid function
- Impotence (biologically-male), amenorrhea (biologically-female)
- Pain, Kerandel sign (deep hyperesthesia)

Meningoencephalitis stage

- AKA "Sleeping sickness"
- Cachexia
- Sleep disturbances (e.g. diurnal **somnolence**, nocturnal insomnia)
- Headaches
- Altered state of consciousness
- ↓ cognitive function
- Personality, behavioral change
- Muscle spasms, ataxia, tremor, flaccid paralysis, choreiform movements
- Psychiatric manifestations (e.g. psychosis)

DIAGNOSIS**DIAGNOSTIC IMAGING****MRI**

- Cerebral
 - May show multifocal white matter hyperintensity (indicates late-stage disease)

LAB RESULTS**Serologic testings**

- Card agglutination test for trypanosomiasis (CATT)
 - Blood + drop of reagent with trypanosomal antigen
- Immunofluorescence
- Enzyme immunoassays

Cerebrospinal fluid (CSF) examination

- Disease staging essential
- ↑ leukocytes
- ↑ proteins
- IgM/Trypanosoma presence

- Morula/Mott cells (pathognomonic)
 - IgM-filled plasma cells

Direct microscopy

- Organism observation in lymph node aspiration, bone marrow, CSF, blood (thin/thick Giemsa-stained smears)

Laboratory findings

- Hemolytic anemia; leukocytosis; thrombocytopenia; ↑ erythrocyte sedimentation rate; hypergammaglobulinemia; hypoalbuminemia, hypocomplementemia; ↑ C-reactive protein; coagulation abnormalities

Histological observation

- Meningoencephalitis stage (CSF sample)
 - Morula/Mott cells in white matter (pathognomonic), edema, microhemorrhages, perivascular proliferation

OTHER DIAGNOSTICS

Electroencephalogram (EEG)

- Late stage: abnormal, slow delta waves

TREATMENT

MEDICATIONS

- Antiprotozoal medication
 - **Hemolymphatic stage**: pentamidine, suramin
 - **Meningoencephalitis stage**: eflornithine, eflornithine + nifurtimox, melarsoprol

OTHER INTERVENTIONS

- Prevention
 - Vector control, surveillance
 - Protective clothing

TRYPANOSOMA CRUZI

osms.it/trypanosoma-cruzi

PATHOLOGY & CAUSES

- Protozoan, intracellular parasite
 - Causes American trypanosomiasis, AKA Chagas disease
- Morphologic forms (life cycle)
 - Amastigote (intracellular, no flagellum) → epimastigote (in triatomine midgut) → trypomastigote (infectious form)
- Reservoirs
 - Opossums, armadillos, canines
- Vectors
 - Triatomine bugs ("kissing bugs")
 - **Common species**: *Rhodnius prolixus*, *Triatoma dimidiata*, *Triatoma infestans*
 - **Characteristics**: size (2–3cm/0.79–1.18in); obligate hematogenous; feeds at night; lives in dark, warm sites (e.g. closets, thatched roofs)

Transmission

- Triatomine bite → fecal wound contamination
- Contaminated food/water ingestion (infection through mucous membranes)
- Parenteral (e.g. blood transfusion, sharing syringes)
- Vertical (mother → fetus)

Endemic regions

- Rural areas of southern U.S., Latin America

Pathogenesis

- *T. cruzi* trypomastigote inoculation → bloodstream → organ invasion (heart, enteric nervous system) → interstitial inflammation → tissue destruction → fibrosis

Disease stages

- **Acute phase**: 8–12 weeks
- **Indeterminate phase**: decades

- **Chronic phase:** cardiac/gastrointestinal disease

RISK FACTORS

- Recent endemic area travel, immunosuppression, blood transfusion, organ transplant, intravenous drug use

COMPLICATIONS

- Heart failure, acute myocarditis, meningoencephalitis, systemic/pulmonary embolism, sudden death



Figure 104.1 The kissing bug, *Triatoma infestans*, is found in Central and South America and is a vector for Chagas disease.

SIGNS & SYMPTOMS

Acute phase

- Mostly asymptomatic
- **Systemic:** malaise, fever, anorexia, headaches
- **Chagoma:** nodular skin lesion at infection site; usually on face/extremities
- **Romaña's sign:** unilateral eyelid edema, conjunctivitis, preauricular lymphadenitis; follows conjunctival inoculation
- Lymphadenopathy
- Hepatosplenomegaly

Indeterminate phase

- Asymptomatic

Chronic phase

- **Cardiac manifestations:** dyspnea, fatigue, palpitation, chest pain, edema, mitral/tricuspid regurgitation murmur, splitting of S2
- **Gastrointestinal manifestations:** megacolon (constipation, bloating, abdominal pain); megaesophagus (dysphagia, regurgitation)

Congenital disease

- **Systemic:** low birthweight, anasarca, fever
- Petechiae
- Hepatosplenomegaly
- Neurologic abnormalities (e.g. hypotonia, tremor)

DIAGNOSIS

DIAGNOSTIC IMAGING

- **Further studies:** stage, clinical syndrome dependent

Chest X-ray, MRI, echocardiogram

- Enlarged cardiac silhouette (cardiomegaly)
- Pericardial effusion
- Valvular regurgitation
- Left ventricular aneurysm

Barium studies

- Megacolon, megaesophagus

LAB RESULTS

- Polymerase chain reaction (PCR)

- Blood culture

Direct microscopy

- Organism observation in thin/thick blood smears; for acute phase disease (high parasitemia)

Serologic testing

- E.g. enzyme-linked immunosorbent assay (ELISA), immunofluorescence

Xenodiagnosis

- Feed laboratory triatomes with person's blood → examine feces weeks later

Cardiac tissue microscopy

- *Acute disease*: intracellular pseudocysts (amastigotes inside myocytes), interstitial inflammation
- *Chronic disease*: mural thrombi, interstitial fibrosis, myocyte necrosis

OTHER DIAGNOSTICS

ECG

- *Arrhythmia evidence*: bundle branch/AV block

TREATMENT

MEDICATIONS

- Antitrypanosomal treatment
- *Advanced cardiac disease*: cardiac arrest prevention, ventricular fibrillation through antiarrhythmic medication

OTHER INTERVENTIONS

Prevention

- Vector control, treat parasitemia before conception

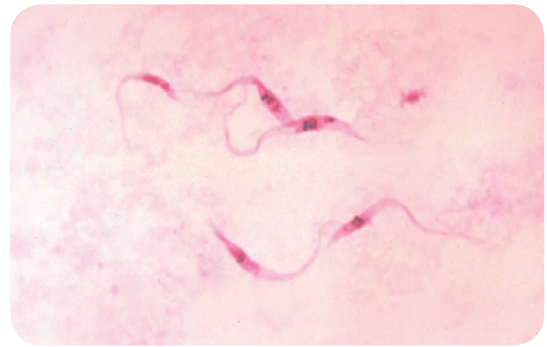


Figure 104.2 *Trypanosoma* species seen on a peripheral blood smear from an individual with Chagas disease.